

## (12) UK Patent Application (19) GB (11) 2 152 221 A

(43) Application published 31 Jul 1985

(21) Application No 8431590

(22) Date of filing 14 Dec 1984

(30) Priority data

(31) 58/244212 (32) 26 Dec 1983 (33) JP

(51) INT CL<sup>4</sup>  
G01W 1/10(52) Domestic classification  
G1X 13(56) Documents cited  
EP A1 0123729(58) Field of search  
G1X

(71) Applicant

Casio Computer Co Ltd (Japan),  
6-1 2-chome Nishi-shinjuku, Shinjuku-ku, Tokyo,  
Japan

(72) Inventor

Yoshio Ogata

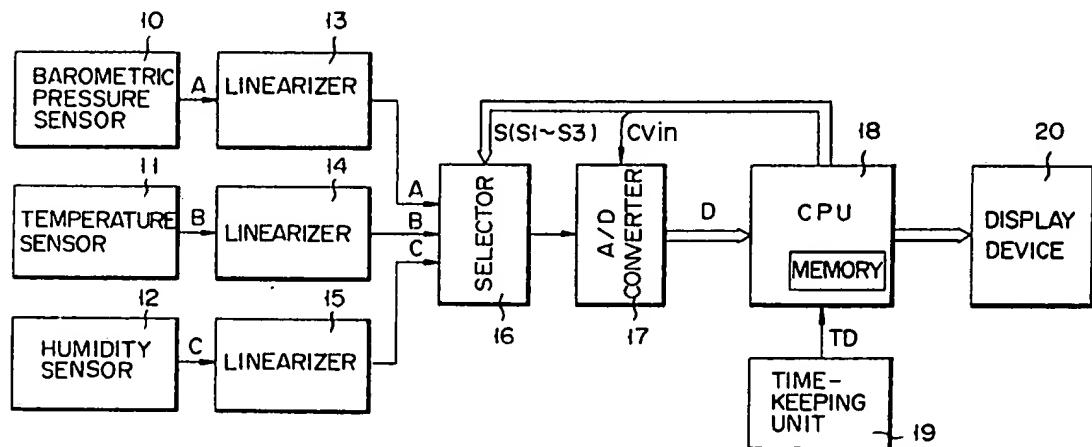
(74) Agent and/or Address for Service

A A Thornton & Co,  
Northumberland House, 303-306 High Holborn,  
London WC1V 7LE

## (54) Weather forecasting apparatus

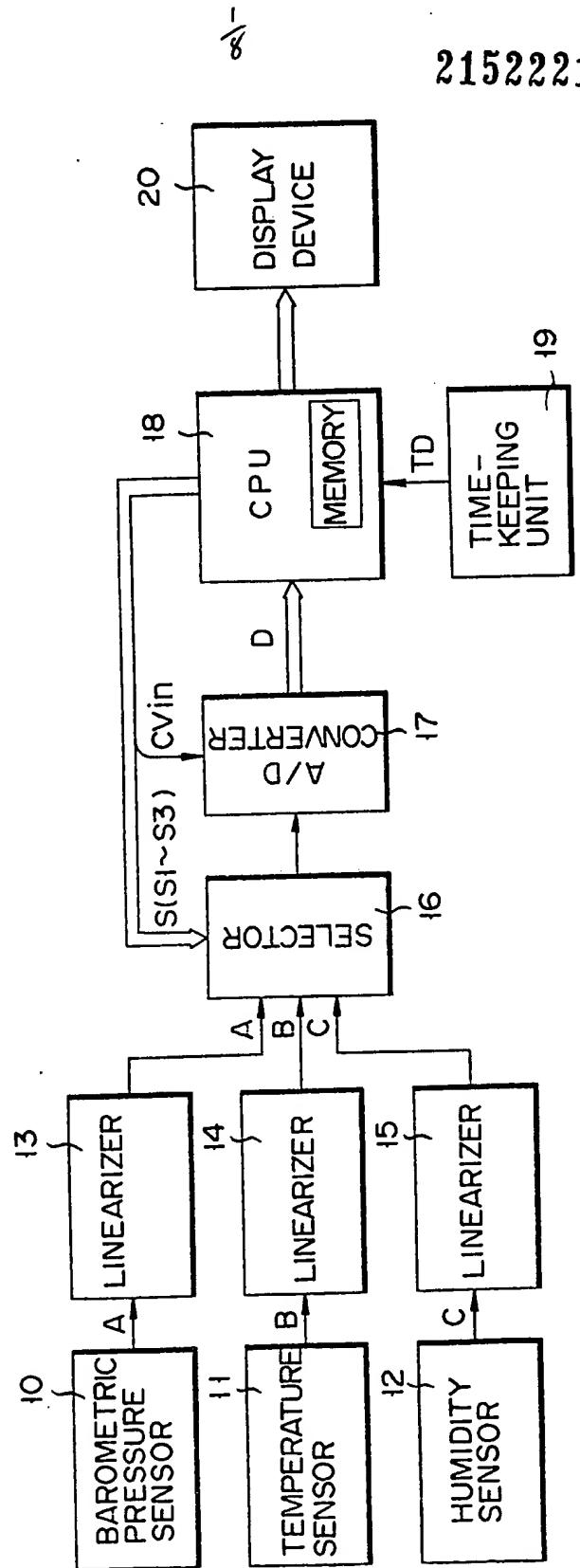
(57) A weather forecasting apparatus is adapted to extract weather parameter data at sensors (10, 11, 12) and linearize them in linearizers (13, 14, 15). Any of the weather parameter data is selected by a selector (16), converted by an A/D converter (17) to digital value, and time-sequentially stored in a memory (18a) of a CPU (18). The weather parameter data stored in the memory (18a) is processed by CPU (18) and displayed on a display unit (20), as weather forecasting data.

FIG. 1



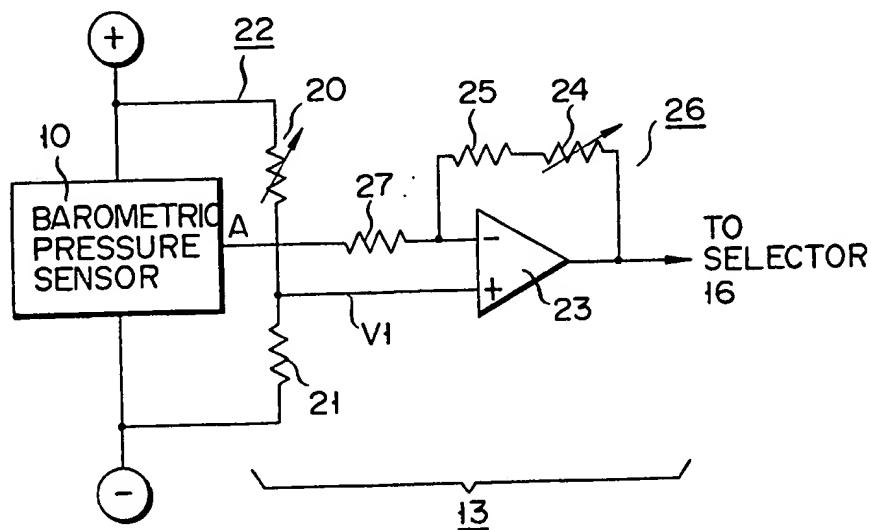
GB 2 152 221 A

FIG. 1

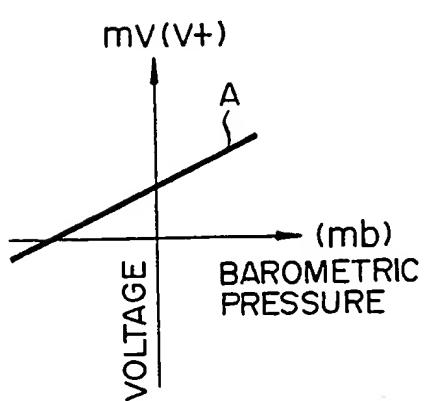


2152221

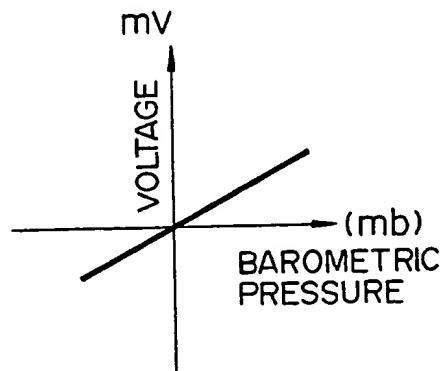
F I G. 2



F I G. 3(a)

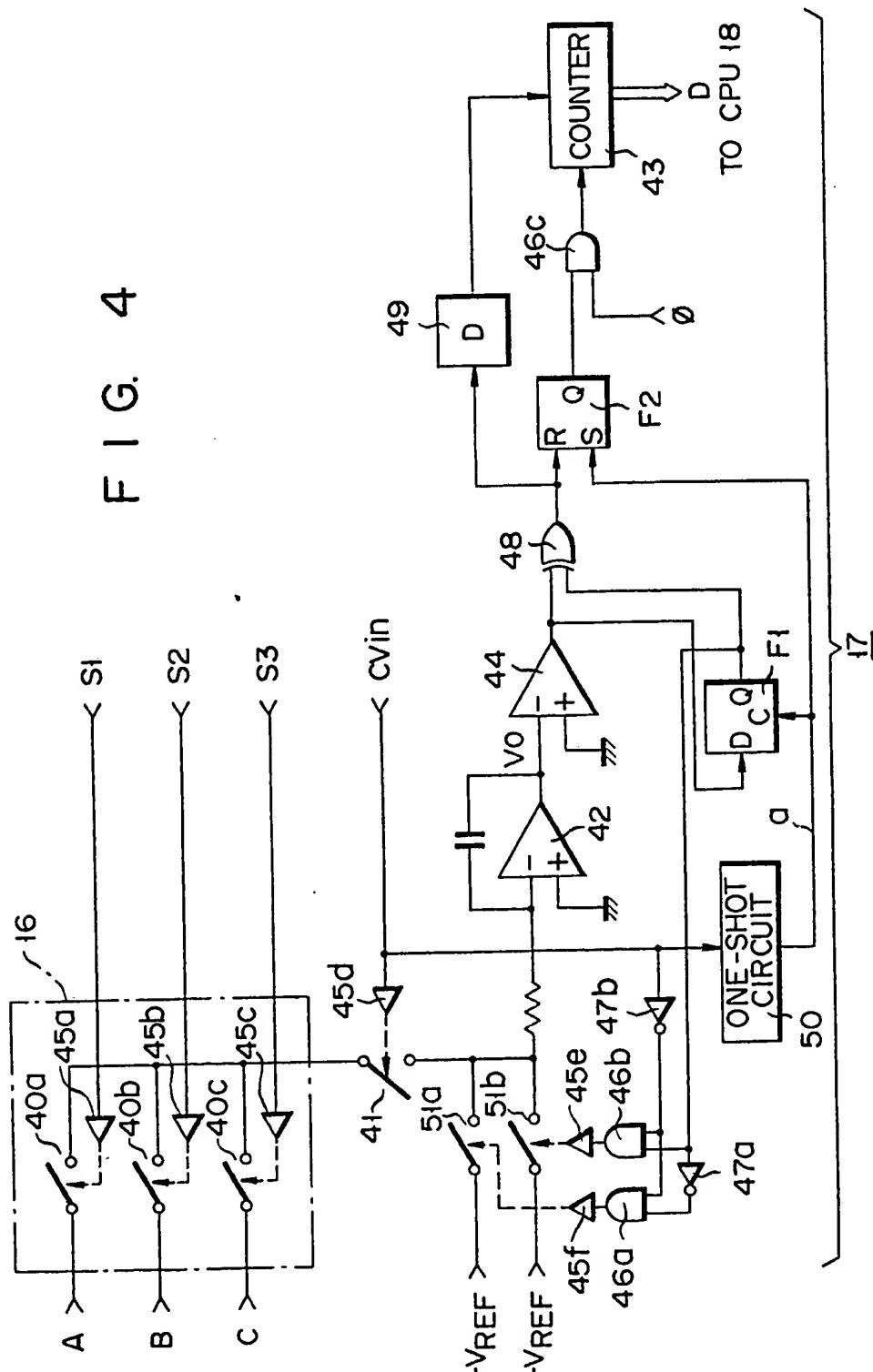


F I G. 3(b)

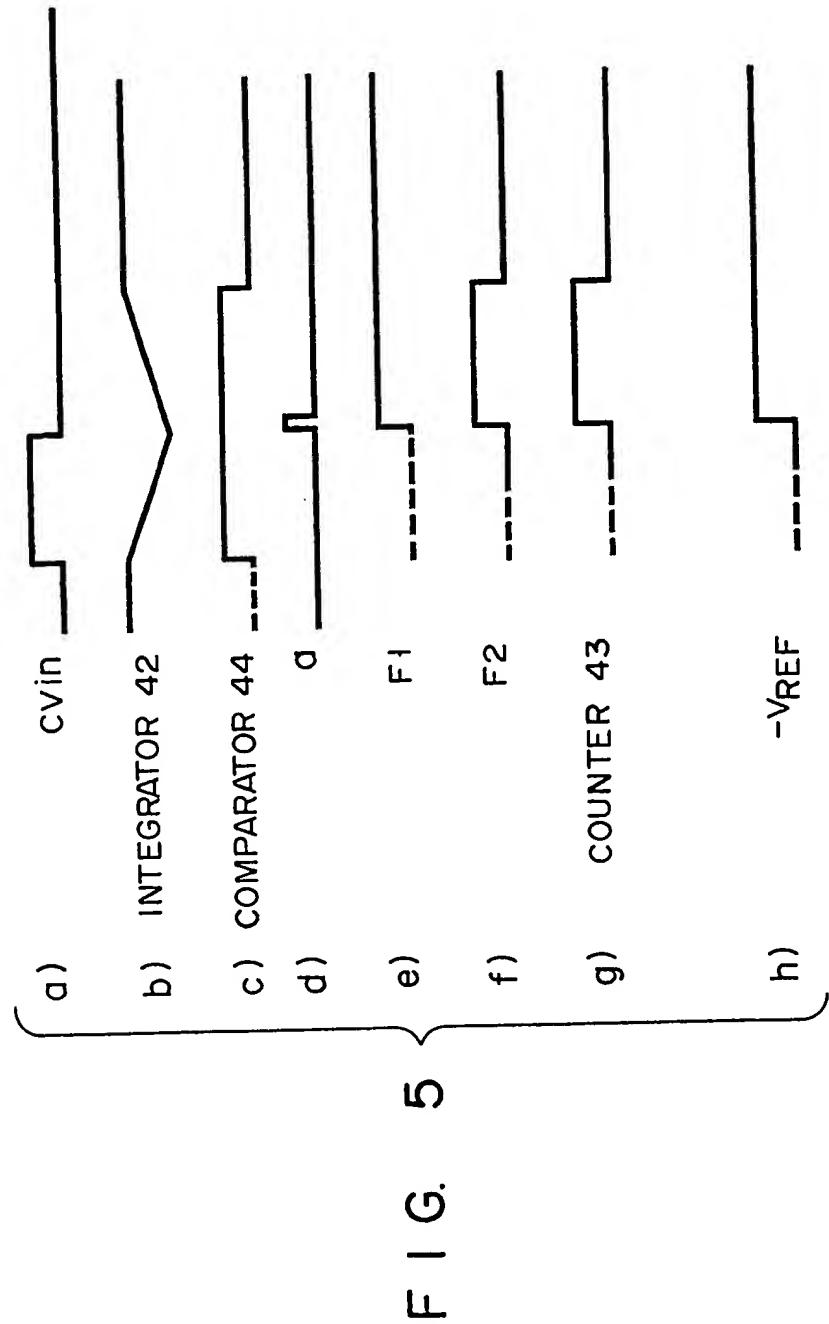


2152221

FIG. 4

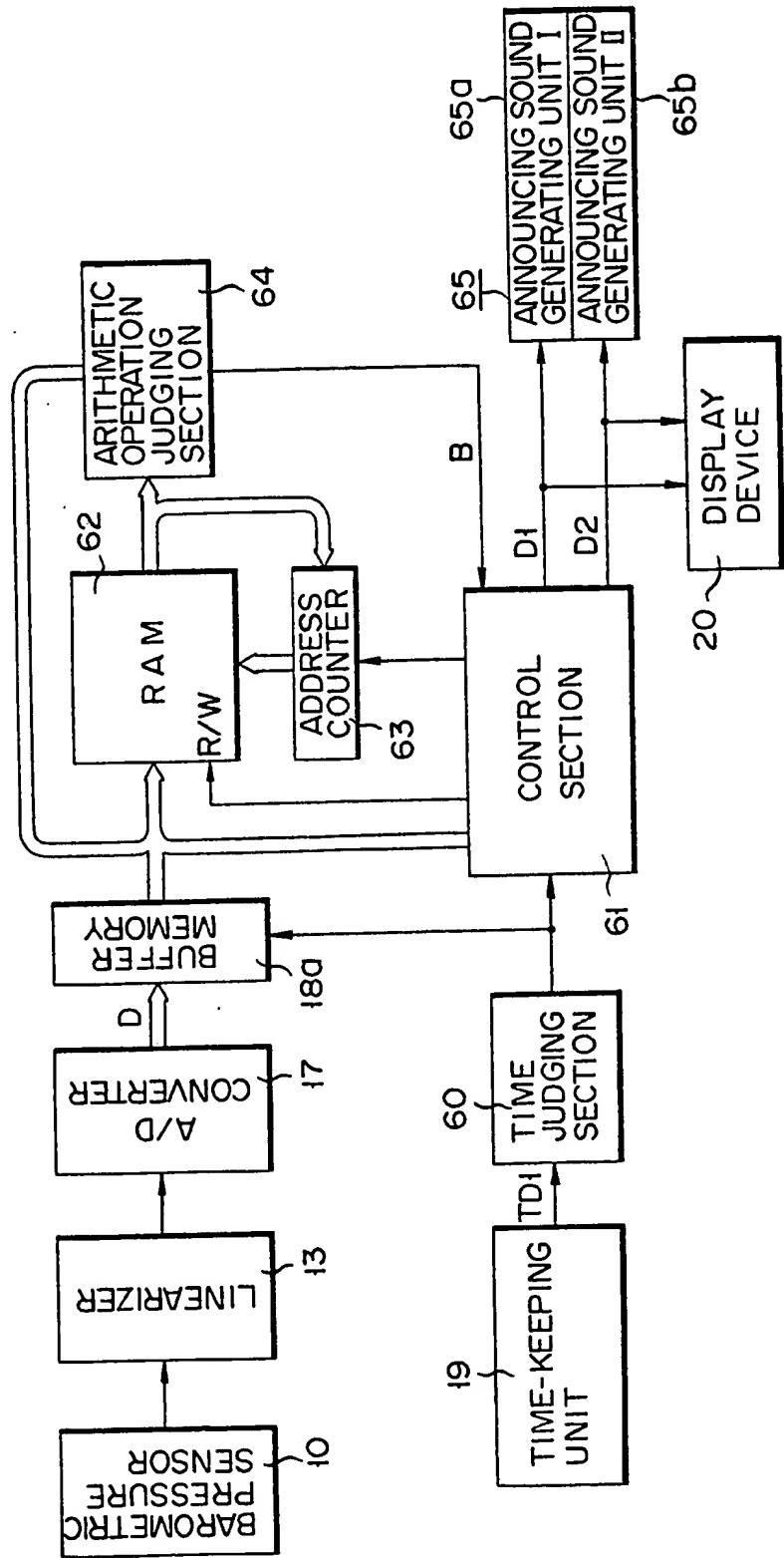


2152221



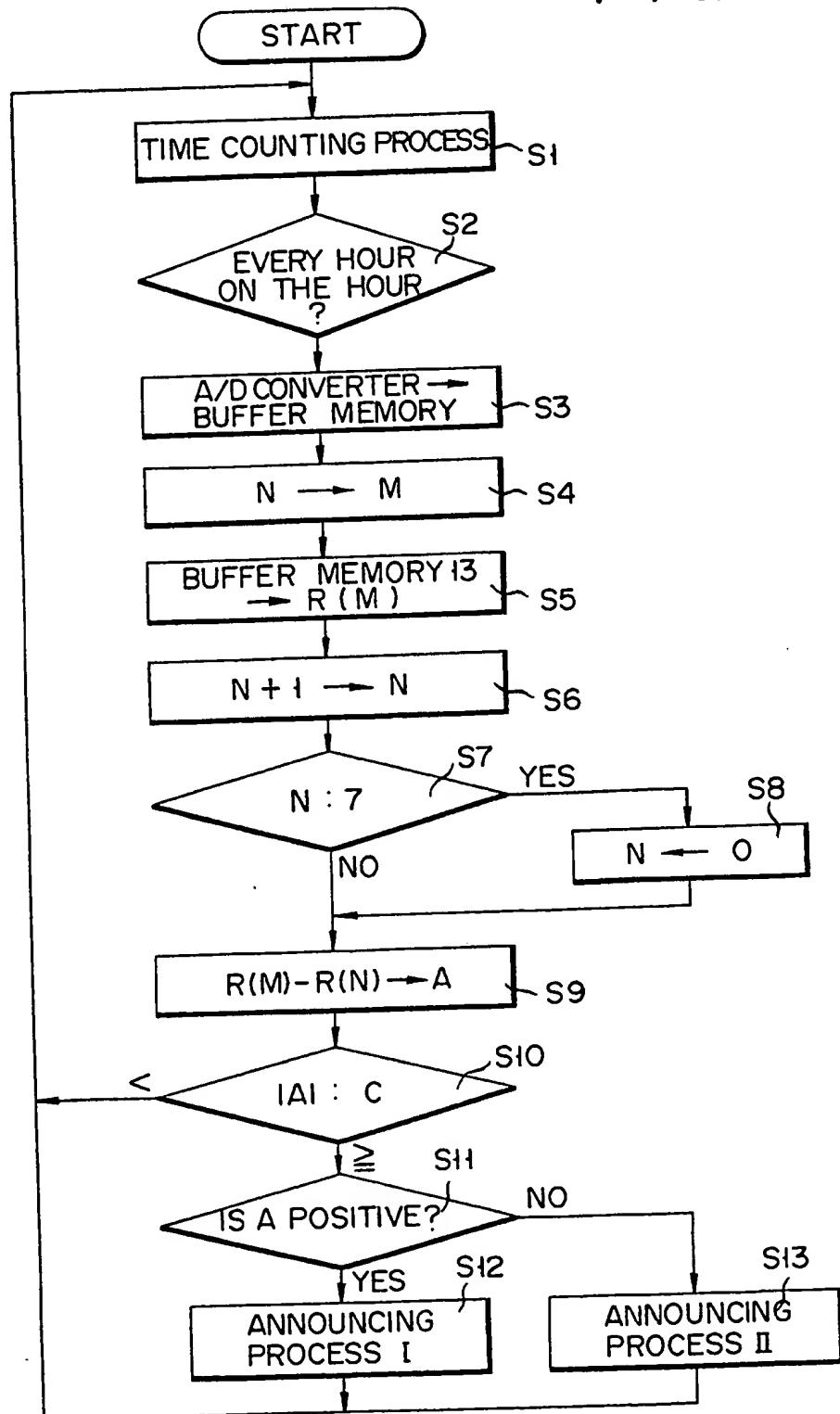
2152221

FIG. 6



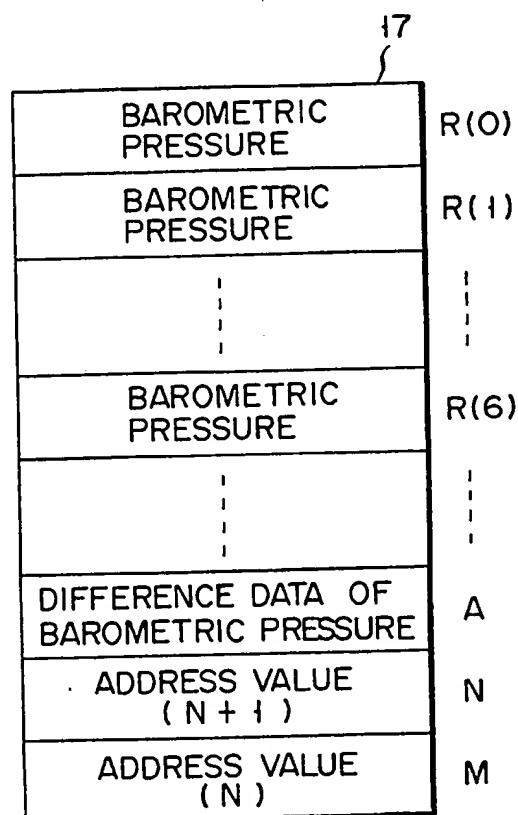
2152221

F I G. 7



2152221

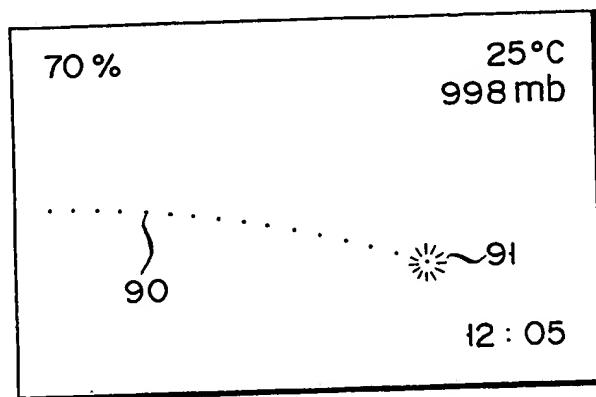
## F I G. 8



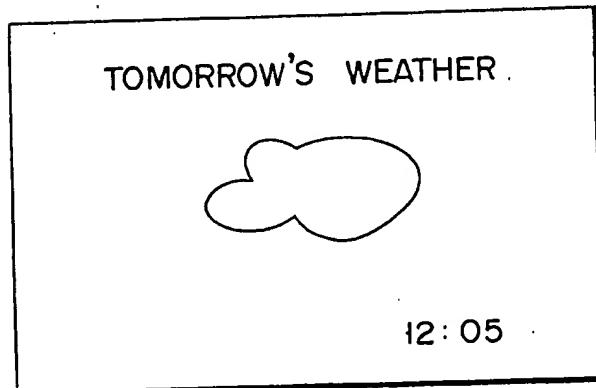
8/4

2152221

## F I G. 9



## F I G. 10



## SPECIFICATION

## Weather forecasting apparatus

5 This invention relates to a weather forecasting apparatus adapted to implement a weather forecasting function on an electronic circuit.

10 Weather forecasting data is important data to human life, and it is the usual practice to forecast a change of climate in a wide geographical area. However, it is not the common practice to forecast a climatic change prevailing in the narrower geographical area around an observer or a weather forecaster.

15 The conventional weather forecasting apparatus is usually of a mechanical type using a diaphragm, etc. The apparatus of this type is large in size, high in cost, and liable to be physically affected due to oscillations, mis-  
20 handling, etc.

This invention has been achieved under these circumstances and an object of this invention is to provide a small-size weather forecasting apparatus which can forecast a  
25 change of climate prevailing at a narrow local area around the observer or weather fore-  
30 caster and which can be stably operated even under outer influences, such as vibrations, to permit ready identification of present weather forecast data.

35 In order to achieve the above-mentioned object, there is provided a weather forecasting apparatus which comprises a sensor means for extracting weather parameter data varying according to a climatic change; an A/D converter means for converting the weather parameter data extracted by the sensor means to a digital value; a weather parameter data storing means for time-sequentially storing the  
40 weather parameter data converted to a digital value; a weather parameter data processing means for preparing weather forecasting data on the basis of the calculated result between present weather parameter data of the  
45 weather parameter data time-sequentially stored in the weather parameter data storing means and the weather parameter data present before a predetermined time; and a display means for displaying weather forecasting data prepared by the weather parameter data processing means.

50 The weather forecasting apparatus of this invention time-sequentially stores weather parameter data such as barometric pressure, temperature, humidity, etc., in a narrower geographical area around a weather forecaster or an observer, prepares weather forecast data on the basis of the weather parameter data and displays it. It is therefore possible to  
55 readily and positively known a brief local weather forecast based on such data. Furthermore, according to this invention, it is possible to implement the weather forecasting function by an electric circuit arrangement,  
60 and thus it is possible to offer a small-sized  
65

weather forecasting apparatus capable of being operated in a stable way, thus permitting the observer to readily know the weather forecast, for example, around his home.

70 This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block circuit diagram showing a  
75 weather forecasting apparatus according to one embodiment of this invention;

Fig. 2 is a practical circuit diagram showing a linearizer 13 as illustrated in Fig. 1;

Figs. 3(a) and 3(b) are each a view showing  
80 an operation of the linearizer shown in Fig. 2;

Fig. 4 is a practical circuit including a selector 16 and A/D converter 17 as shown in Fig. 1;

Figs. 5(a) to 5(h) are a timing chart for  
85 explaining the operation of the A/D converter 17 shown in Fig. 4;

Fig. 6 shows a practical circuit of a weather parameter data processing means for preparing weather forecasting data from barometric  
90 data of weather parameter data detected;

Fig. 7 shows a flow chart for explaining the operation of the circuit shown in Fig. 6;

Fig. 8 is a view showing an arrangement of a RAM 62 shown in Fig. 6; and  
95 Figs. 9 and 10 each show an example of the weather forecasting data on a displaying unit shown in Figs. 4 and 6.

A weather forecasting apparatus according to one embodiment of this invention will be  
100 explained below in connection with the accompanying drawings.

Fig. 1 shows a block diagram showing an arrangement of a weather forecasting apparatus according to one embodiment of this invention. A barometric pressure sensor 10, temperature sensor 11, and humidity sensor 12 detect the barometric pressure, temperature and humidity, respectively. Detection signals A, B and C of the sensors 10, 11 and 12  
105 are supplied to corresponding linearizers 13, 14 and 15, respectively, where they are linearized to be supplied to a selector 16. The linearizers 13, 14 and 15 are each comprised of a circuit as shown, for example, in Fig. 2.

110 The linearizer 13 includes the barometric pressure sensor 10 (usually a solid-state semiconductor sensor) connected between the power source terminals and a voltage divider 22 comprising a series connection of an originad-  
115 justsing variable resistor 20 and resistor 21.

The voltage divider 22 connected between the power source terminals generates a linearized output A on the basis of a signal which is detected at the barometric pressure sensor  
120 10. A voltage-divided voltage V1 from the voltage divider 22 is supplied to a noninverting input terminal of an operational amplifier 23. The detection signal A of the barometric sensor 10 is supplied through a resistor 27 to  
125 an inverting input terminal of the operational

130

amplifier 23. The operational amplifier 23 includes a feedback circuit 26, connected between the inverting terminal of the operational amplifier 23 and an output terminal, 5 and comprises a resistor 25 and a variable resistor 24 for adjusting a slope of the linearized output of the detection signal A. The linearizer 13 causes the detection signal A of the barometric pressure sensor 10 as shown 10 in Fig. 3(a) to be linearized, as shown in Fig. 3(b).

The selector 16 selects respective detection signals A, B and C, which are supplied from the linearizers 13, 14 and 15, according to a 15 select signal (S1, S2, S3) from a microprocessor (hereafter referred to as a CPU) and delivers a selected signal to an analog/digital converter 17 (hereafter referred to as an A/D converter).

20 The A/D converter 17 converts the respective detection signal (A, B, C) of the selector 16 to a digital signal D according to a control signal CVin from CPU 18 and sends it to CPU 18. The selector 16 and A/D converter 17 25 are constructed as shown, for example, in Fig. 4. The selector 16 includes switch circuits 40a, 40b and 40c controlled by the select signals S1, S2 and S3 of CPU 18. The respective detection signals A, B and C are 30 supplied respectively through switch circuits 40a, 40b and 40c to the A/D converter 17. As this time, the respective detection signals A, B and C are supplied to the A/D converter 17 through a switch circuit 41 controlled by 35 the control signal CVin from the CPU, noting that the A/D converter 17 is comprised of, for example, a double integral system. The A/D converter 17 utilizes a principle on which the output voltage of an integrator 42 is proportional to a product of the magnitude of the 40 input voltages (A, B, C) and a time length over which the input signal is supplied.

As shown in Fig. 5(a), when the control 45 signal CVin is fed from CPU 18, the detection signal A, for example, is input to the integrator 42 through the switch circuit 41, thus starting an integrating action. At the same time, as shown in Fig. 5(c), a comparator 42 produces a comparison output based on a 50 comparison between a reference potential (ground level) and an output of the integrator 42. Upon a fall of the waveform of the control signal CVin, a "fall" one-shot circuit 50 produces a one-shot pulse a, as shown in Fig. 5(d), to cause a flip-flop F1 to be driven as 55 shown in Fig. 5(e). Since at this time the comparator 44 delivers the output to an exclusive OR circuit 48, no output appears from the exclusive OR circuit 48. Upon receipt of 60 the oneshot pulse a, a flip-flop F2 is set, and the output of the flip-flop F2 is supplied through an OR circuit 46c to a counter 43. The counter 43 starts a count operation, as 65 shown in Fig. 5(g), in synchronism with the fall of the control signal CVin. At the fall of

the control signal CVin, an AND circuit 46b receives an output from an inverter 47b and an output of the flip-flop F1 and delivers an output through a driver 45e to a switch 15b, 70 where it is closed. As a result, the integrator 42 performs a discharging action, as shown in Fig. 5(b), upon receipt of a reference voltage signal ( $-V_{REF}$ ) as shown in Fig 5(b) At the completion of the discharging action, the output of the comparator 44 is zero, and thus the exclusive OR circuit 48 delivers an output to a flip-flop F2, where it is set. As a result, the counter 43 stops its count operation. A ratio 75 between the measured voltage level of the detection signal A and the reference voltage level corresponds to a time period from the starting of an integrating action from a zero level until returning to a zero volt through the discharging action. As a consequence, the 80 count value from the starting of the count operation of the counter 43 to the stopping of the count operation, as shown in Fig. 5(g), corresponds to a digital output D of the detection signal A.

85 In Fig. 4, reference numerals 45a to 45f show drivers, 46a to 46c denote AND circuits, and 49 shows a delay circuit. When the output of the integrator 42 has its polarity opposite to that shown in Fig. 5(b), a plus 90 reference voltage signal ( $+V_{REF}$ ) is supplied through a switch 51a. The digital output signal D from the A/D circuit 17 is supplied to CPU 18. The respective digital signals D representing the barometric pressure, temperature and humidity are time-sequentially 95 stored in a memory 18a of CPU 18, in accordance with time count data TD supplied from a time-keeping unit 19. Weather forecasting data is prepared based on the time- 100 sequentially digital signals in the memory 18a of CPU 18 and displayed on a display unit 20 such as a liquid crystal display unit, a CRT, display unit, etc.

105 A practical circuit arrangement for preparing the weather forecasting data on the basis of the above-mentioned digital signal will be explained below in connection with its operation by referring to Figs. 6 to 8.

The embodiment shown in Fig. 6 shows a 110 case where only the barometric pressure is detected as weather parameter data. A detection output of a barometric pressure sensor 10 is supplied through a linearizer 13 to an A/D converter 17. A digital signal D corresponding to the detection output is stored in a 115 buffer memory 18a. The barometric sensor 10 comprises, for example, a solid-state semiconductor sensor for detecting barometric pressure. The linearizer 13 linearizes the detection 120 signal of the barometric pressure sensor 10 and supplies it to an analog/digital converter 17 (hereafter referred to as an A/D converter), where it is converted to a digital signal. The digital signal is supplied to a buffer 125 memory 18a. The buffer memory 18a time-

130

sequentially stores barometric pressure data D (digital signal) in synchronism with an every hour signal TD2 from a time judging section 60, for example, for every hour. In this connection it is to be noted that said every hour signal corresponds to every hour on the hour. When, of the time count signals TD1 supplied from a time-keeping unit 19, the every hour signal is judged as such, a time judging section 60 delivers only the every hour signal (TD2) to the buffer memory 18a and control section 61.

Based on an initially stored program, the control section 61 permits barometric pressure data A in the buffer memory 18a to be time-sequentially stored in a RAM 62. RAM 62 sequentially stores the barometric pressure data A in address R(0) to R(6) for every hour that the addresses are set by an address counter 63 in a manner as set out in Fig. 8. In computing judging section 64 reads present barometric data and its preceding barometric data from RAM 62 under the control of the control section 61 to compute a difference between the respective barometric data. When a computed difference level is greater than a predetermined barometric reference level, the computing/judging section 64 delivers to the control section 61 a judged signal B which designates a process for permitting an announcement of a rapid climatic change. The control section 61 delivers rapid climatic change announcing signals D1 and D2 to a display section 20 and an announcing sound generating section 65, depending upon the judged signal B. The display section 20 is comprised of, for example, a CRT display device, displaying the rapid climatic change data (i.e., bad or good data) according to the announcing signals D1 and D2. The announcing sound generating section 65 comprises an announcing sound generating unit 65a for announcing a rapid climatic change or bad weather and an announcing sound generating unit 65b for announcing good weather. These units 65a and 65b are operated depending on the announcing signals D1 and D2.

The operation of the weather forecasting apparatus will be explained below by referring to Figs. 7 and 8.

The detection signal of the barometric pressure sensor 10 is converted by the A/D converter 17 to a digital signal, and the barometric pressure data D, which is a digital signal, is stored in the buffer memory 18a in step S3 in a flow chart of Fig. 7. At this time, the time count signal TD1, which is obtained through the time counting processing by the time-keeping circuit 19, permits the time judging section 60 to judge whether or not the signal TD1 is an every hour signal TD2 in steps S1, S2. The barometric pressure data D is stored in the buffer memory 18a in synchronism with the every hour signal such as 65 12:00 or 13:00.

The value of a register N is transferred to a register M in step S4, and then the barometric data D in the buffer memory 18a is stored in RAM 62 at a predetermined address R(M)

70 in step S5. If, at this time, an initial value of the register N is 0, the barometric data D is stored in RAM 62 at an address R(0) as shown in Fig. 8. Present barometric pressure data D are time-sequentially stored in RAM 62 at addresses R(1), R(2)...R(6) according to the every hour signal TD2.

In step S6, the data of the register N is supplied to the computing/judging section 64, where it is incremented by +1. In step 80 S7, the computing/judging section 64 judges whether or not the content of the register N reaches "7".

When the content of the register N is equal to "7", the process goes to step S8, and the 85 register N is cleared. When, on the other hand, the content of the register N is not equal to "7", then the process goes to step S9.

In step S9, the computing/judging section 90 64 computes  $R(M) - R(N) \rightarrow A$ , i.e., a difference A between present barometric pressure data stored in the address R(M) of RAM 62 and the oldest barometric pressure data in address R(N) of RAM 62 corresponding to the 95 barometric pressure, six hours earlier than the present barometric pressure.

At step S10, the computing/judging section 64 judges whether or not an absolute value  $|A|$  of the difference A exceeds a predetermined barometric constant C (for example, 100 4 mb) which has been initially set. When the absolute value  $|A|$  of the difference A exceeds the barometric pressure constant C as a result of a judgment (a judged signal B), the control 105 section 61 judges the difference A data to be positive or negative (step S11). If the difference A data is positive, then the control section 61 delivers the climatic change announcing signal D1 to the display section 20, 110 where it displays a trend of a rapid change to bad weather, and to a climatic change announcing section 65a, where a corresponding announcing sound is generated. That is, it is detected that the present barometric pressure 115 level rapidly drops (a level greater than the barometric constant C) in comparison with the earlier level and a corresponding processing I is carried out, indicating that the weather will be bad (step S12). If, on the other hand, the 120 difference A data is negative, then the control section 61 delivers a corresponding signal D2 to the display section 20 where it displays a trend for the weather to be good. At the same time, the corresponding announcing sound 125 generating section 65b delivers a corresponding sound. This is a procedure II carried out at step S13.

In this way, the barometric pressure data is stored for every predetermined time period 130 (for example, for each hour), and the differ-

ence A is found from a subtractive combination of the present barometric pressure data and the earlier data, permitting a time-sequential measurement of a rate of barometric pressure change. When the rate of barometric pressure change exceeds the predetermined reference value (the barometric pressure constant C), a corresponding signal is generated, announcing, in particular, a rapid change to bad weather. As a consequence, where bad weather is forecasted due to a rapid drop in barometric pressure, it is possible to automatically and immediately announce such a rapid climatic change.

15 How the weather parameter data detected at the respective sensors are displayed on the display section 20 will be explained below by referring to Figs. 9 and 10.

As in the circuit arrangement of Fig. 1, CPU 20 1 permits the respective weather parameters to be time-sequentially stored in its memory 18a on the basis of time count data supplied to the time-keeping unit 19. In this case, the respective weather parameter data are stored 25 in the memory 18a, for example, for every hour. CPU 18 permits the respective weather data in the memory 18a to be time-sequentially displayed, as required, on the display unit 20. That is, as shown in Fig. 9, for example, 30 the temperature (25°C), humidity (70%) and barometric pressure (998 mb) for a predetermined time (12:05) are displayed as the weather parameters on the display unit 20. The graph, as shown in Fig. 9, plots a barometric pressure change against a predetermined time period (for example, 24 hours) up to the present time, noting that the point 91 shows the present barometric pressure level. The curve for the barometric pressure change 35 40 graph is time-sequentially displayed on the display unit 20, while under the control of CPU 18, on the basis of the barometric pressure data time-sequentially stored in the memory 18a. The time data is prepared by CPU 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5575 5580 5585 5590 5595 5600 5605 5610 5615 5620 5625 5630 5635 5640 5645 5650 5655 5660 5665 5670 5675 5680 5685 5690 5695 5700 5705 5710 5715 5720 5725 5730 5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840 5845 5850 5855 5860 5865 5870 5875 5880 5885 5890 5895 5900 5905 5910 5915 5920 5925 5930 5935 5940 5945 5950 5955 5960 5965 5970 5975 5980 5985 5990 5995 6000 6005 6010 6015 6020 6025 6030 6035 6040 6045 6050 6055 6060 6065 6070 6075 6080 6085 6090 6095 6100 6105 6110 6115 6120 6125 6130 6135 6140 6145 6150 6155 6160 6165 6170 6175 6180 6185 6190 6195 6200 6205 6210 6215 6220 6225 6230 6235 6240 6245 6250 6255 6260 6265 6270 6275 6280 6285 6290 6295 6300 6305 6310 6315 6320 6325 6330 6335 6340 6345 6350 6355 6360 6365 6370 6375 6380 6385 6390 6395 6400 6405 6410 6415 6420 6425 6430 6435 6440 6445 6450 6455 6460 6465 6470 6475 6480 6485 6490 6495 6500 6505 6510 6515 6520 6525 6530 6535 6540 6545 6550 6555 6560 6565 6570 6575 6580 6585 6590 6595 6600 6605 6610 6615 6620 6625 6630 6635 6640 6645 6650 6655 6660 6665 6670 6675 6680 6685 6690 6695 6700 6705 6710 6715 6720 6725 6730 6735 6740 6745 6750 6755 6760 6765 6770 6775 6780 6785 6790 6795 6800 6805 6810 6815 6820 6825 6830 6835 6840 6845 6850 6855 6860 6865 6870 6875 6880 6885 6890 6895 6900 6905 6910 6915 6920 6925 6930 6935 6940 6945 6950 6955 6960 6965 6970 6975 6980 6985 6990 6995 7000 7005 7010 7015 7020 7025 7030 7035 7040 7045 7050 7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 10000 10005 10010 10015 10020 10025 10030 10035 10040 10045 10050 10055 10060 10065 10070 10075 10080 10085 10090 10095 10100 10105 10110 10115 10120 10125 10130 10135 10140 10145 10150 10155 10160 10165 10170 10175 10180 10185 10190 10195 10200 10205 10210 10215 10220 10225 10230 10235 10240 10245 10250 10255 10260 10265 10270 10275 10280 10285 10290 10295 10300 10305 10310 10315 10320 10325 10330 10335 10340 10345 10350 10355 10360 10365 10370 10375 10380 10385 10390 10395 10400 10405 10410 10415 10420 10425 10430 10435 10440 10445 10450 10455 10460 10465 10470 10475 10480 10485 10490 10495 10500 10505 10510 10515 10520 10525 10530 10535 10540 10545 10550 10555 10560 10565 10570 10575 10580 10585 10590 10595 10600 10605 10610 10615 10620 10625 10630 10635 10640 10645 10650 10655 10660 10665 10670 10675 10680 10685 10690 10695 10700 10705 10710 10715 10720 10725 10730 10735 10740 10745 10750 10755 10760 10765 10770 10775 10780 10785 10790 10795